ALASKA DISTRICT

Recontamination and Recharacterization, Ham Lake Area, Northway Staging Field, Alaska

Shah Alam, Kenneth Andraschko, Daniel McKay and Richard Ragle, U.S. Army Corps of Engineers

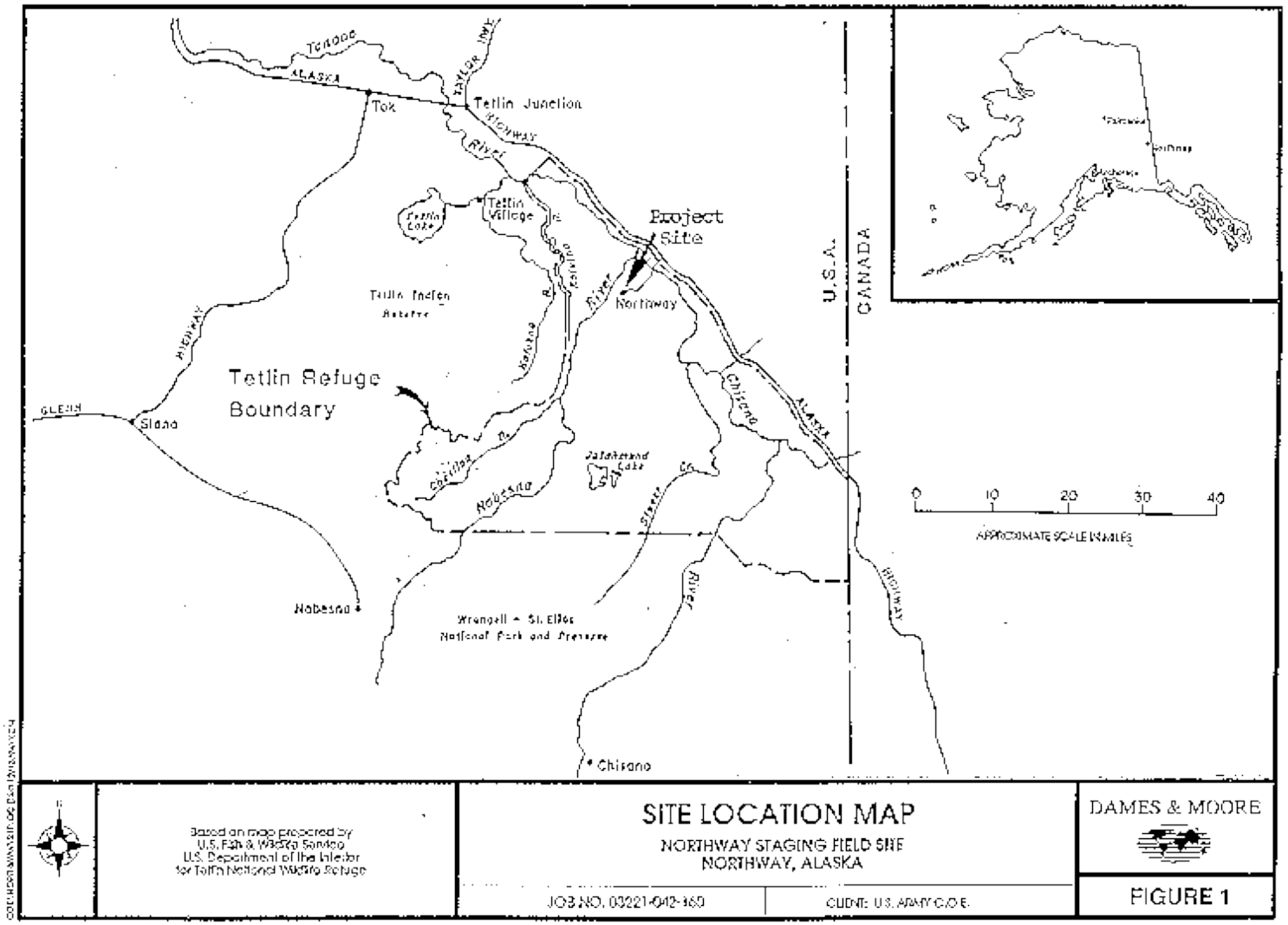
Debra Caillouet, Alaska Department of Environmental Conservation

Formerly Used Defense Sites Alaska

AK ALASKA DISTRICT

- **Properties**
- **603 FUDS in Alaska**
- **Projects**
- **302 projects (on 128 properties)**

Northway Staging Field, Location



Northway Staging Field

ALASKA DISTRICT

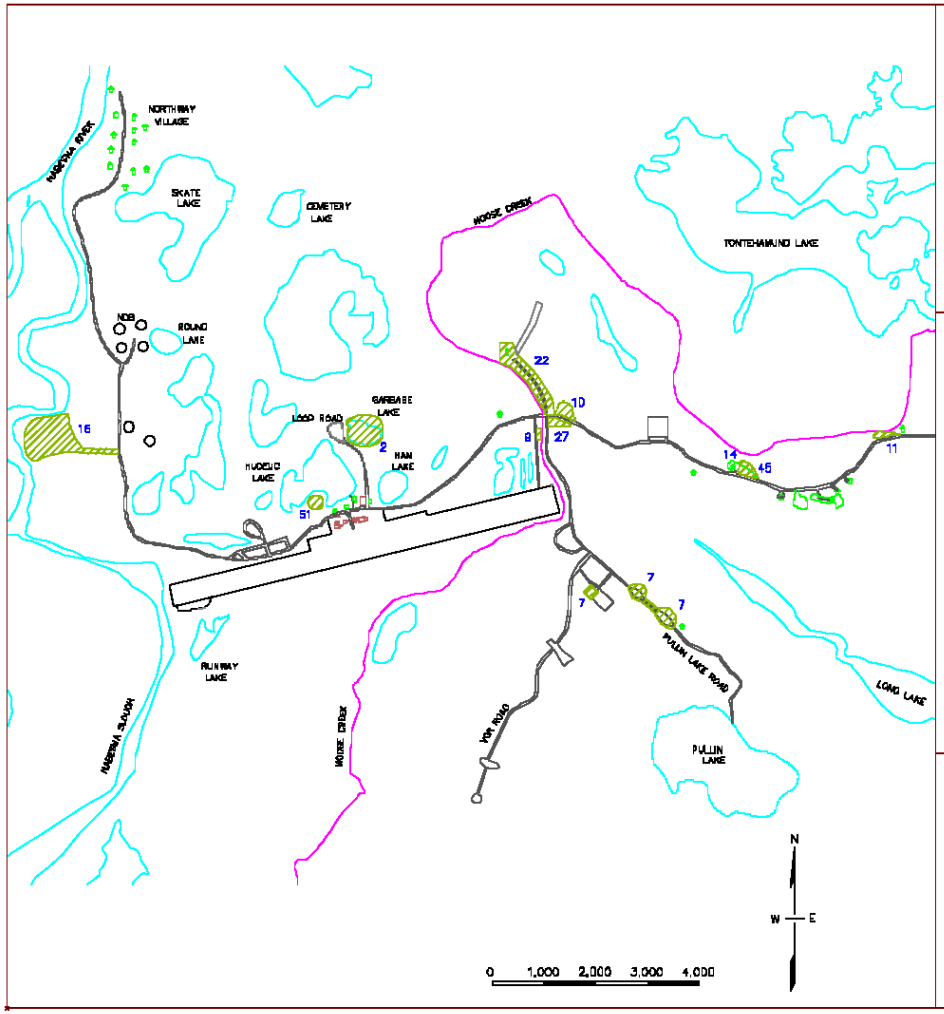
During World War II

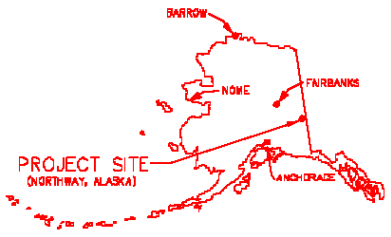
- **Refueling Depot and Maintenance Stop for aircraft**
- **Staging Area for work on the Alaskan Highway, the Canadian Oil pipeline project, and the Haines-Fairbanks Fuel pipeline.**

Northway Airport (1949)

ALASKA DISTRICT

112 - 4 Northway Airport from Southeast Northway





LOCATION MAP

LEGEND

OU3
2. GARBAGE LAKE AND LANDFILL
7. BULK FUEL ASTS
9. WOODEN TAR BARREL DUMP
10. TAR AND SAND MOUNDS
11. CAMP DUMP
14. ENNA ALBERT RESIDENCE
16. NABESNA RIVER TRAILS
22. AVIS SAM RESIDENCE
27. GREASE PIT
45. WHITE POWER DRUMS
51. FORMER BARRACKS

2 AREA OF CONCERN

RESIDENCE

SOURCE: 1955 USGS NABESNA (D-2) QUADRANGLE AND 1982 AERIAL PHOTOGRAPHS

Vicinity Map
Proposed Plan

Northway Staging Field
Northway, Alaska

Ham Lake

HAM
LAKE
LOOP
ROAD
HUDEUC
LAKE
MOOSE CREEK
MOOSE CREEK
BULK FUEL
PULLIN LAKE ROAD
LONG
LAKE

Ham Lake Background

ALASKA DISTRICT

- Investigations 1994-1997
- Excavation and treatment of soil - 1998

Ham Lake Excavation near concrete pad

AK ALASKA DISTRICT

- 784 cubic yards of soil excavated

Excavation backfilled with clean fill

ALASKA DISTRICT

Ham Lake excavation Completed

ALASKA DISTRICT

Ham Lake (2002)

ALASKA DISTRICT

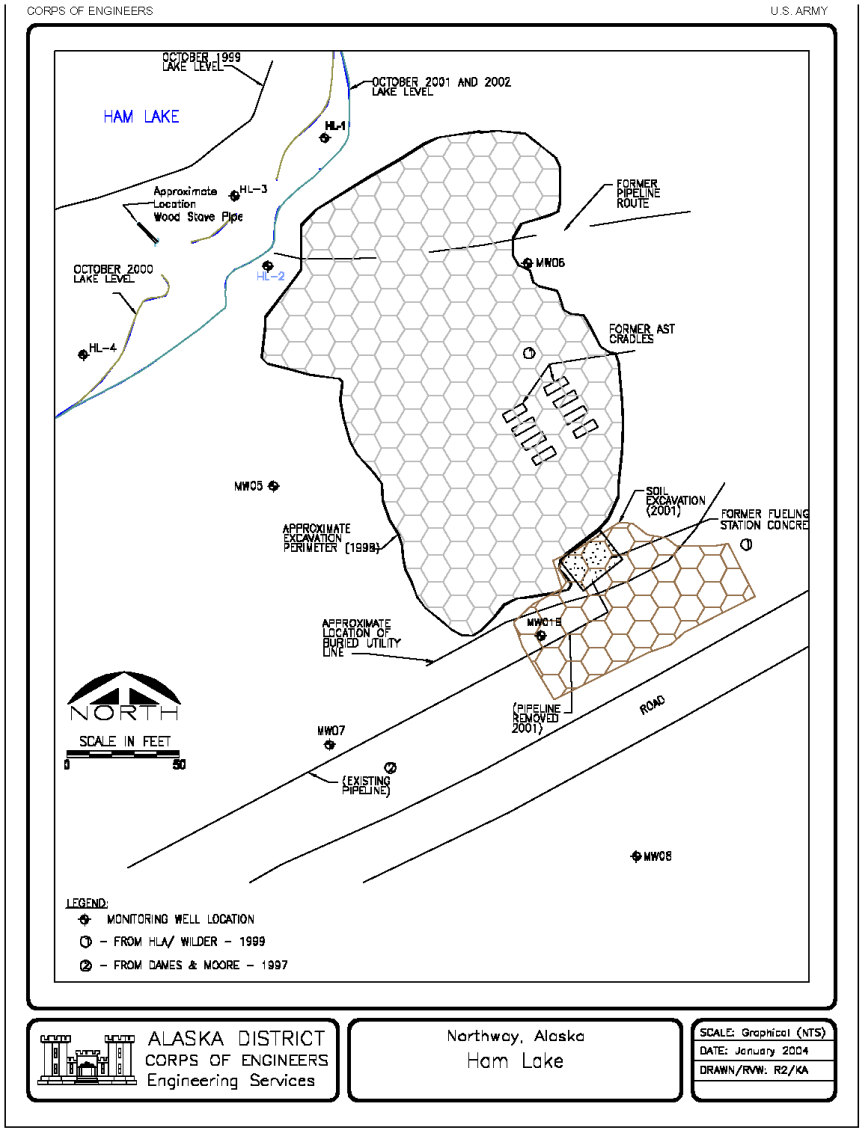
Contamination found in 1999

ALASKA DISTRICT

- Contaminated Soils
  - Around Concrete Pad
  - Around wood stave pipe
- Contaminated Groundwater
  - Three feet of floating petroleum product

Ham Lake 2004

ALASKA DISTRICT



Rising water-level

ALASKA DISTRICT

Raised Lake Level (2001)

ALASKA DISTRICT

Recontamination Source

ALASKA DISTRICT

- **Migration from another contaminated site, about half-a-mile away, along utility lines**
  - Fuels responsible for the initial and the later contaminations were different
  - Remnants of pipelines discovered
- **Soil excavation and backfilling melted the upper part of the permafrost and created a thaw-bulb that released trapped liquid petroleum**

Recharacterization of Recontamination in 2003

ALASKA DISTRICT

- Recovered and delineated extent of free products
- Investigated source of soil and groundwater contamination using Laser Induced Fluorescence (LIF) probe technology
- Sampled monitoring wells twice a year

Free Product Investigation

ALASKA DISTRICT

Northway Staging Field Investigation

LIF Process

ALASKA DISTRICT

- UV light through fiber optic cable strung within rods
- light exits through a window in the side of the probe
- As the probe is advanced the soil is exposed to the UV light
- fluorescent compounds exist light is emitted
- The "signal" light is transmitted through a fiber, back up hole to be analyzed
- Responses are indicated in real-time on a graph of signal vs. depth.

Fluorescence

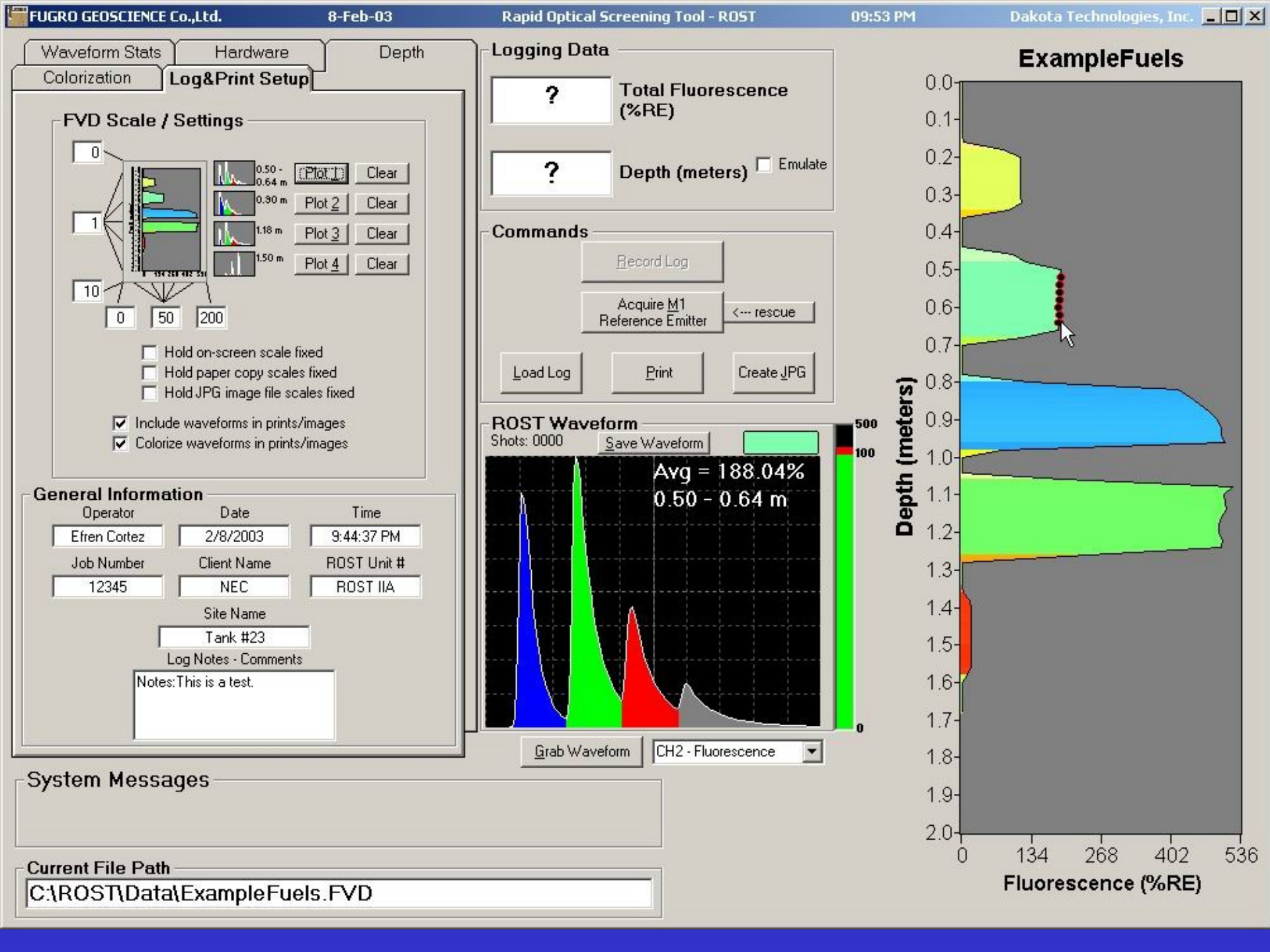
ALASKA DISTRICT

- **Property of some compounds – where absorbed UV stimulates the release of photons**
- **Ultraviolet light source fluoresces the PAHs**
- **High Power sources and Optical Fibers – Technology now available in the field**

LIF Capabilities

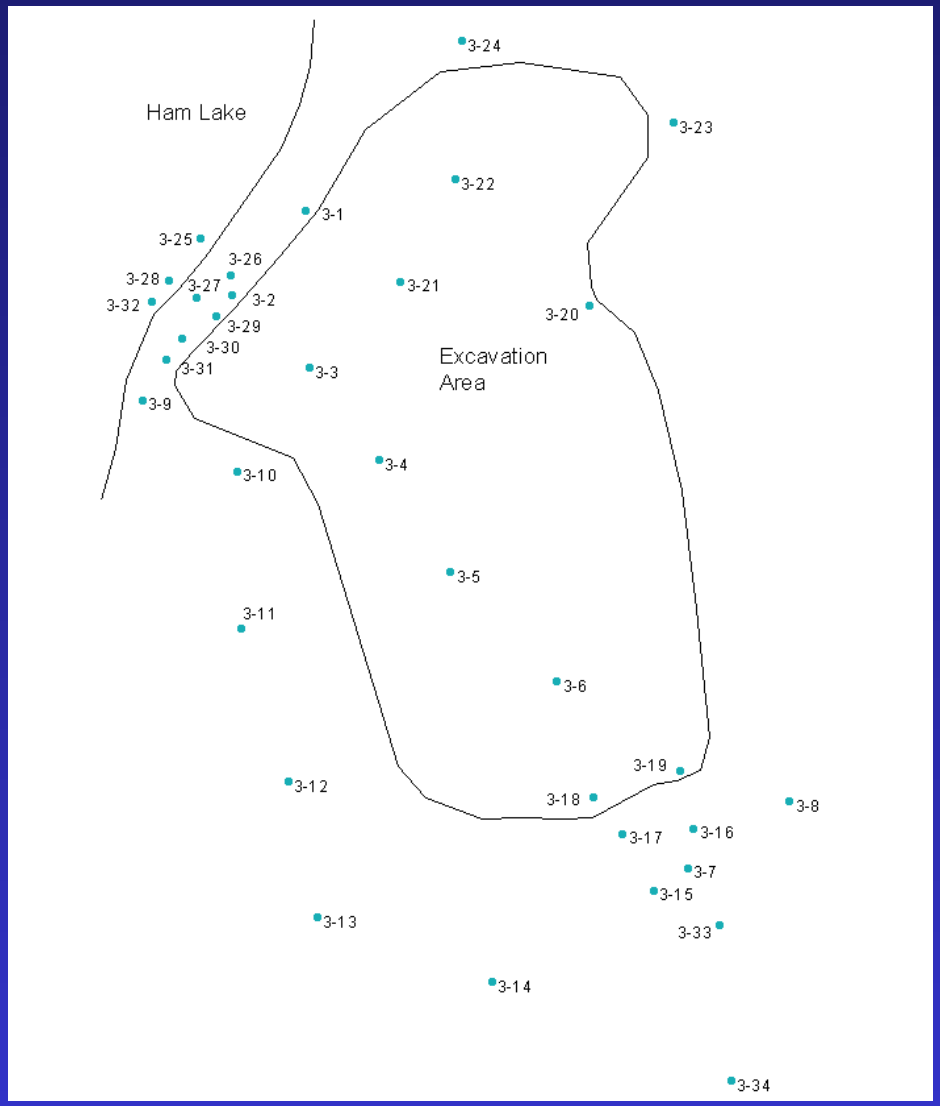
ALASKA DISTRICT

- **Capable of determining level of hydrocarbon contamination vs depth**
- **Down to 100 ppm in sandy soils**
- **Differentiate between jet fuel, diesel, gasoline, heating oils, creosote, etc.**
- **Continuous output is recorded over the entire depth of investigation**


FUGRO GEOSCIENCE Co.,Ltd.
8-Feb-03
Rapid Optical Screening Tool - ROST
09:53 PM
Dakota Technologies, Inc.
Waveform Stats
Hardware
Depth
Colorization
Log&Print Setup
FVD Scale / Settings
0
1
10
0
50
200
0.50 - 0.64 m
0.90 m
1.18 m
1.50 m
Plot 1
Plot 2
Plot 3
Plot 4
Clear
Clear
Clear
Clear
Hold on-screen scale fixed
Hold paper copy scales fixed
Hold JPG image file scales fixed
Include waveforms in prints/images
Colorize waveforms in prints/images
General Information
Operator
Efren Cortez
Date
2/8/2003
Time
9:44:37 PM
Job Number
12345
Client Name
NEC
ROST Unit #
ROST IIA
Site Name
Tank #23
Log Notes - Comments
Notes:This is a test.
Logging Data
?
Total Fluorescence (%RE)
?
Depth (meters)
Emulate
Commands
Record Log
Acquire M1 Reference Emitter
<--- rescue
Load Log
Print
Create JPG
ROST Waveform
Shots: 0000
Save Waveform
Avg = 188.04%
0.50 - 0.64 m
500
100
0
Grab Waveform
CH2 - Fluorescence
System Messages
Current File Path
C:\ROST\Data\ExampleFuels.FVD
ExampleFuels
Depth (meters)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
2.0
0
134
268
402
536
Fluorescence (%RE)

Locations of LIF points

ALASKA DISTRICT



Conclusions

ALASKA DISTRICT

- Small amount of free product recovered
- Free product localized
- LIF technology effectively delineated soil and groundwater

Future Work

ALASKA DISTRICT

- Excavate soil near wood stave pipe when lake levels permit
- Assess risks and consider monitored natural attenuation for benzene contaminated soils
- Monitor groundwater contamination

Wrangell Mountains

ALASKA DISTRICT